Russian Armored Route-Clearing Vehicle BAT-2

SYSTEM

Alternative Designations: None
Date of Introduction: 1981
Proliferation: At least 2 countries.
Description:
Crew: 2+8
Engineer Capacity: 8
Chassis: MT-T
Weight (mt): 39.7
Length Overall (m): 9.64
Height Travel (m): 3.69
Width Overall (m): 4.2
Clearance (mm): 430
Gradient (°): INA
Trench Crossing (m): 2.7
Fording Depth (m): 1.3
Vertical Step (m): .8

AUTOMOTIVE

Engine: V-64-4 multi-fuel diesel, 700 hp
Cruising Range (km): 500
Speed (km/h): 60
Navigation Equipment: INA
NBC Protection: Yes
Radio: INA

BLADE

Width (m): Variable. Mounted vertically in front and over the crew cab when not in use.
Bulldozer Position: 4.5
Road Clearing/building: 4.2
Grading: 4.1-4.35

Operating Depth (solid and frozen soil) (m)**:** .5

Operating Speed (km/h):
Road Building:
Ground Unobstructed: 6-8
Ground with Trees $\leq$ 30 cm: 2-3
Snow: 8-15
Hourly Capacity (m^3/hr):
Ditch Digging: 200-250
Filling in Ditches, Craters, etc: 350-450

CRANE

Capacity (mt): 2
Boom Length (m): 7.3

WINCH

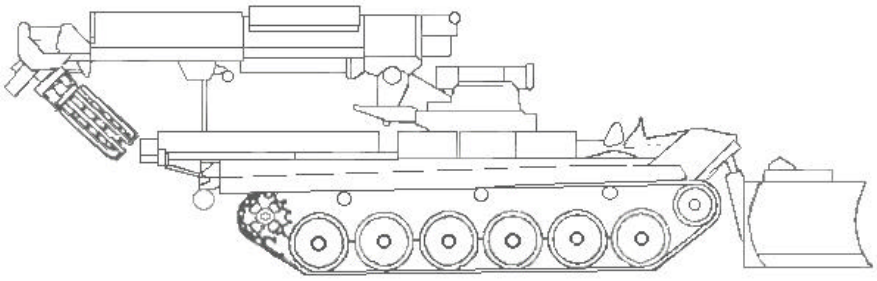
Capacity (mt): 25
Cable Length (m): 100

VARIANTS
None

NOTES
The BAT-2 is a follow-on to the BAT and BAT-M dozers, but better fits the classification of armored route-clearing vehicle rather than that of a high-speed armored dozer. Its cab is fully armored and it is designed to operate in the forward areas of the battlefield. The windows in the front, sides, and rear are bullet-proof further enhancing battlefield survivability.

The ability to carry an eight-man engineer squad facilitates its role in the movement support detachment. Other BAT-2 missions include road building, obstacle, (stone and wood) removal, and snow removal operations. The vehicle is also designed to operate in urban terrain and as an NBC vehicle. Storage areas for engineer supplies have been designed into the vehicle. The BAT-2 has a crane, a ripper, and a winch.

Russian Obstacle Clearing Vehicle IMR-2M



SYSTEM

Alternative Designations: N/A
Date of Introduction: 1982
Proliferation: FSU and former Warsaw Pact armies

Description:
Crew: 2
Chassis: T-72A
Weight (mt): 44.3
Length (traveling) (m): 9.55
Height (traveling) (m): 3.68
Width (traveling) (m): 3.73
Gradient (°): 25
Fording Depth (m): 1.2
System Components: Multipurpose dozer equipment, boom, treadway mine exploder

AUTOMOTIVE

Engine: 12 cyl, 840 hp, diesel
Cruising Range (km): 500
Speed (km/h): 60
Night Driving Equipment: Yes
Radio: R-173 radio, R-174 intercom
NBC Protection System: Yes
Smoke Screening System: INA

BLADE

Can be used as a dozer, grader and V-blade, vertical plane skew ability.
Operating Speed (bulldozer) (km/h): 8-12
Earth Displacement (m^3/hr): 300
Lane Clearing Rate (km): .35

ALL-PURPOSE TOOL

Trench Digging (1.1 to 1.3m deep)(m^3/hr**):** 8-10
Pit Digging (up to 2.5m deep) (m^3/hr)**:** 12-16

BOOM

Capacity (mt): 2
Reach (m): 8.4

MINE SWEEPING SPEED (km):

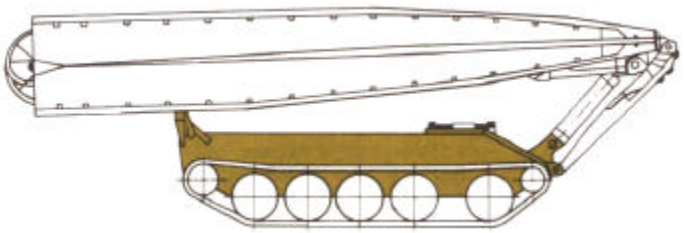
AT pressure mines: 6-15
Tilt Rod mines: 7

VARIANTS

IMR: The IMR is a NBC-protected, combat engineer vehicle based on the T-54/55 tank chassis. It is fitted with an articulating dozer blade and a telescoping crane that fits a number of attachments.
IMR-2: Equipped with mine sweepers and mine-clearing extended charges. Line drawing is of IMR-2.

NOTES
The IMR-2M differs from the IMR-2 in that the IMR-2M has no line-launched mineclearing charge. The IMR-2M has more armor, hydraulic equipment and a scraper-ripper.

Czechoslovak Armored Vehicle-Launched Bridge MT-55A



SYSTEM

Alternative Designations: None
Date of Introduction: 1970
Proliferation: At least 20 countries.
Description:
Crew: 2
Chassis: T-55A Tank (modified)
Weight (mt): 36
Length with Bridge (m): 9.90
Height with Bridge (m): 3.35
Width with Bridge (m): 3.30
Ground Clearance (mm): 425
Gradient (°): 30
Fording Depth (m): 1.4
Vertical Step (m): .7
Trench (m): 2.7

VARIANTS
None

AUTOMOTIVE

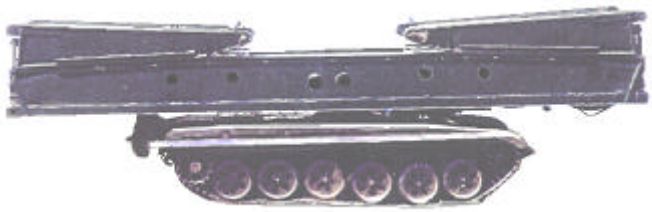
Engine: V-12 Diesel, 580 hp
Cruising Range (km): 690
Speed (km/h):
Max Road: 32-35
Average Cross-Country: 16-20
Radio: R-123
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: Vehicle engine exhaust smoke system.

BRIDGE

Type: Scissors
Capacity (mt): 50
Width of Obstacle (m): 17
Width (m): 3.3
Length Opened (m): 18
Weight (kg): 6.5
Emplacement Time (min): 2
Displacement Time (min): 5-6

NOTES
The MT-55A has a gap measuring device and infrared equipment for bridge-laying at night. It can also launch the MT-72 bridge.

Russian Armored Vehicle-Launched Bridge MTU-72



SYSTEM

Alternative Designations: None
Date of Introduction: 1974
Proliferation: At least one country.
Description:
Crew: 2, Commander and driver
Chassis: T-72S
Weight (mt): 40
Length with bridge (m): 11.64
Height with bridge (m): 3.38
Width with bridge (m): 3.46
Ground Clearance (mm): 49
Gradient (°): 31
Side Slope (°): 22
Fording Depth (m): 1.2
Vertical Step (m): .85
Trench (m): 2.8

VARIANTS
None

AUTOMOTIVE

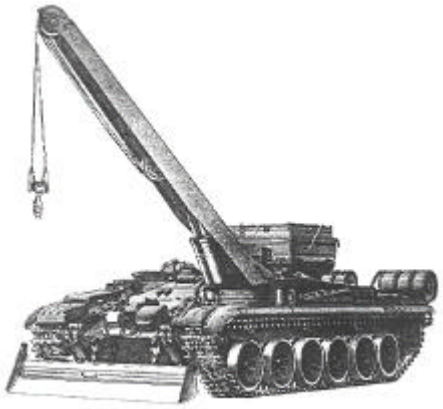
Engine: 840 hp Diesel
Cruising Range (km): 500
Speed (km/h):
Max Road: 60
Max Off-Road: 45
Average Cross-Country: 35
Radio: R-173 and R-134
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: Vehicle engine exhaust smoke system.

BRIDGE

Type: Cantiliver
Capacity (mt): 50
Width of Obstacle (m): 18
Width (m): 3.55
Length Opened (m): 20
Weight (kg): 6,400
Emplacement Time (min): 3
Displacement Time (min): 8

NOTES
The crew is armed with a light machine gun, a submachine gun, and hand grenades for protection.

Russian Armored Recovery Vehicle BREM-1



Weapons & Ammunition Types	Typical Combat Load
12.7-mm AD MG	840

SYSTEM

Alternative Designations: None
Date of Introduction: 1984
Proliferation: At least 5 countries.
Description:
Crew: 3 (see NOTES)
Chassis: T-72 tank
Weight (mt): 41
Length Overall (m): 7.98
Height Travel (m): 2.45
Width Overall (m): 3.46
Clearance (mm): 457
Gradient (°): 30
Trench Crossing (m): 2.8
Fording Depth (m): 1.2
Vertical Step (m): .85

AUTOMOTIVE

Engine: V-12 Multi-fuel Diesel, 840 hp
Cruising Range w/external tanks (km):
Dirt Road w/o Towed Vehicle: 650
Dirt Road Towing Vehicle: 220-430
Highway w/o Towed Vehicle: 700
Speed (km/h):
Max Highway: 60
Dirt Road: 45
Towing Tank on Dirt Road: 12
Smoke Equipment: Vehicle engine exhaust smoke system (VEESS). Four smoke grenade launchers may be fitted.
NBC Protection: Yes
Radio: R-123

BLADE

Width (m): 3.1

CRANE

Capacity (mt):
2 m Extension: 19
4.4 m (max) Extension: 3
Boom Length (max) (m): 4.4

WINCH

Capacity (mt):
Line Pull: 25
With Blocks: 100
Cable Length (m): 200
Auxiliary Wench:
Capacity (line pull) (kg): 530
Cable Length (m): 400

TOWING

Capacity (mt): 50
Towing Rods:
Two 1.68 m
Two 5.5 m
Hydraulic Jack Capacity (mt): 30

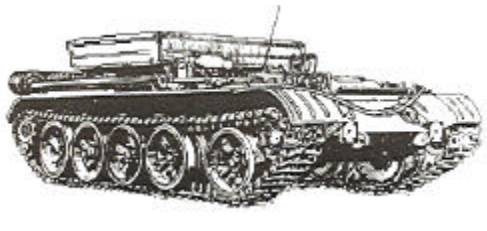
ARMAMENT

Caliber, Type, Name: 12.7-mm, AD MG NSV-T
Mount Type: Cupola
Max Effective Range (m):
AA: 1,500
Ground: 2,000
Fire on Move: Yes

VARIANTS
None

NOTES
The BREM-1 is designed to tow damaged tanks from the battlefield to damaged vehicle collection points. It has a crew of three—commander, driver, and mechanic. Instead of a turret it has a rectangular platform on top of the hull for work and loading.

Russian Armored Recovery Vehicle T-54-T



SYSTEM

Alternative Designations: BTS-2 (Medium Tank Towing Vehicle-2)
Date of Introduction: 1965
Proliferation: At least 50 countries
Description:
Crew: 3 to 5
Chassis: T-54
Weight (mt): 36
Length (m): 7.5
Height (m): 1.9
Width (m): 3.27
Clearance (mm) 264
Gradient (°): 31
Trench Crossing (m): 2.7
Fording Depth (m):
Unprepared: 1.4
With Snorkel: 5.5
Vertical Step (m): .8

AUTOMOTIVE

Engine: V-12 Diesel, 520 hp
Cruising Range (km): 400
Speed (km/h): 48

Smoke Equipment: Vehicle engine exhaust smoke system.
NBC Protection: No. (see VARIANTS)
Radio: INA

CRANE CAPACITY (mt): 1

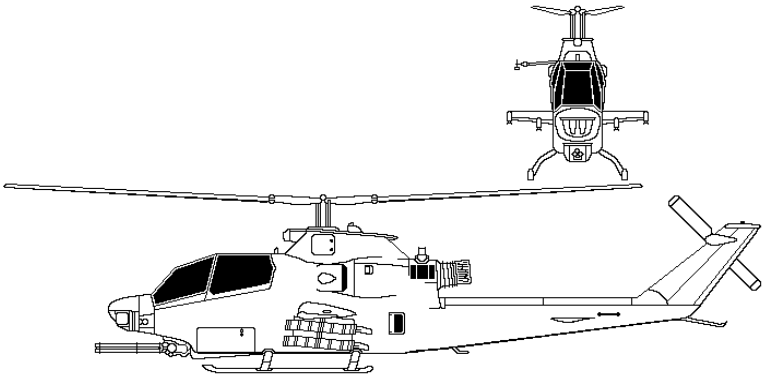
TOWING CAPACITY (mt): At least 40

ARMAMENT
None

VARIANTS
There are numerous variants based on T-54 and T-55 chassis each with differing equipment modifications.
T-54 (A): Former East German manufacture. Push/pull bar at front, 1 mt crane, NBC equipment, no winches or spades.
T-54 (B): Former East German manufacture. Similar to T-54 (A). Tow cables brackets at hull rear, hull front protective plate, snorkel. No winch or spade.
T-54 (C): Former East German manufacture. Heavy-duty crane, snorkel.

NOTES
The T-54-T armored recovery vehicles are based on modified chassis of the T-54 medium tank. The recovery vehicle variants have a crane able to lift up to 3 mt, a loading platform, and a spade on the rear of the vehicle. They can mount a snorkel for deep fording. Performance figures are the same for the T-54 (and T-55) tanks. They replaced older tank recovery vehicles based on the T-34 chassis.

United States Attack Helicopter AH-1F/COBRA



Weapon & Ammunition Types	Combat Load
20-mm 3x barrel Gatling gun	**750**
Other Loading Options	
TOW missile pods (4 each)	**0-2**
2.75-in Hydra 70 rocket pods (19 each)	**2-4**
7.62-mm 6x barrel rotary MG pods	**0-2**

SYSTEM

Alternative Designations: Hueycobra, Bell 209
Date of Introduction: 1986 (AH-1S)
Proliferation: At least 11 countries

Description:
Crew: 2 (pilots in tandem seats)
Blades:
- Main rotor: 2
- Tail rotor: 2

Engines: 1x 1,800-shp AlliedSignal Engines T-53-L-703 turboshaft
Weight (kg):
- Maximum Gross: 4,535
- Normal Takeoff: 4,524
- Empty: 2,993

Speed (km/h):
- Maximum (level): 315
- Cruise: 227

Max "G" Force: INA
Ceiling (m):
- Service: 3,720
- Hover (out of ground effect): INA
- Hover (in ground effect): 3,720

Vertical Climb Rate (m/s): 8.5
Internal Fuel (liters): 991
Range (km):
- Normal Load: 610
- With Aux Fuel: N/A

Dimensions (m):
- Length (rotors turning): 16.3
- Length (fuselage): 13.6
- Width (including wing): 3.2
- Height: 4.1
- Main Rotor Diameter: 13.4
- Tail Rotor Diameter: 2.6

Cargo Compartment Dimensions: negligible
Standard Payload (kg): 1,544

Survivability/Countermeasures:
Infrared signature suppressors mounted on engine exhaust.
Radar warning receivers, IFF, Infrared jammer, chaff and flares.
Armored cockpit.

ARMAMENT
The chin-mounted turret accepts Gatling-type guns ranging from 7.62-mm to 30-mm.
Some aircraft have been modified to accept Stinger missiles (air-to-air Stinger or ATAS).

20-mm 3x barrel Gatling gun, M197:
Range: (practical) 1,500 m
Elevation: 21° up to 50° down
Traverse: 220°
Ammo Type: AP, HE
Rate of Fire: burst 16±4, continuous 730±50

Most Probable Armament:
AH-1G: Either 2x 7.62-mm miniguns with 4,000 rounds or 2x 40-mm grenade launchers with 300 rounds (one each is possible) in chin turret. Also on underwing hardpoints, 2.75-in. FFAR, minigun pods, or 20-mm automatic cannons.

AH-1S: M197, 3x barrel 20-mm Gatling gun in chin turret. Also on underwing hardpoints, 8x BMG71 TOW antitank missiles, and 2x 2.75-in FFAR rocket pods.

AVIONICS/SENSOR/OPTICS
The TOW missile targeting system uses a telescopic sight unit (traverse 110º, elevation –60º/+30º), a laser augmented tracking capability, thermal sights and a FLIR to allow for acquisition, launch, and tracking of all types of TOW missiles in all weather conditions.
The Cobra also uses a digital ballistic computer, a HUD, Doppler nav, and a low speed air data sensor on the starboard side for firing, and has in-flight boresighting.
Available Israeli-made upgrades include an integrated FLIR with laser rangefinder, GPS, automatic boresighting, and the ability to fire both TOW II and Hellfire missiles.

Night/Weather Capabilities:
The AH-1 is fully capable of performing its attack mission in all weather conditions.

VARIANTS
Most older Cobra variants still in operation have been upgraded to the AH-1F standard.
Also produced in Romania and Japan under license from Bell Textron in the U.S.

AH-1G: Initial production model in 1966

AH-1S: Upgraded 1960s produced aircraft in late 1980s to the standard TOW carrying version.

AH-1P: A set of AH-1S aircraft fitted with composite rotors, flat plate glass cockpits, and NVG capabilities.

AH-1E: A set of AH-1S aircraft upgraded with the Enhanced Cobra Armament System incorporating the universal turret, 20-mm gun, automatic compensation for off-axis gun firing, and weapon management system.

AH-1F: Current standard Cobra. Also referred to as the "Modernized Cobra". Incorporated all past upgrades.

AH-1J/-1T/-1W: See separate AH-1W entry.

NOTES
Available munitions are shown above; not all may be employed at one time. Mission dictates weapon configuration. External stores are mounted on underwing external stores points. Each wing has two hardpoints for a total of four stations. A representative mix when targeting armor formations would be eight TOW missiles, two 2.75-in rocket pods, and 750x 20-mm rounds. The gun must be centered before firing underwing stores. Additional missions include direct air support, antitank, armed escort, and air to air combat. Armored cockpit can withstand small arms fire, and composite blades and tailboom are able withstand damage from 23-mm cannon hits and small arms fire. The composite blades and tailboom are able to withstand damage from 23-mm cannon hits.

United States Attack Helicopter AH-1W/SUPERCOBRA

Weapon & Ammunition Types	Combat Load
20-mm 3x barrel Gatling gun	**750**
Other Loading Options	
Hellfire missile pods (4 each)	**0-2**
TOW missile pods (4 each)	**0-2**
2.75-in Hydra 70 rocket pods (19 each)	**2-4**
Sidewinder or Sidearm missiles	**2**
External fuel tanks (liters)	**291/378**

SYSTEM

Alternative Designations: Seacobra, Supercobra, Bell 209
Date of Introduction: 1986
Proliferation: At least 3 countries
Description:
Crew: 2 (pilots in tandem seats)
Blades:
- Main rotor: 2
- Tail rotor: 2

Engines: 2x 1,775-shp General Electric T-700-GE-401 turboshaft
Weight (kg):
- Maximum Gross: 6,700
- Normal Takeoff: 6,700
- Empty: 4,670

Speed (km/h):
- Maximum (level): 350
- Cruise: 270

Max "G" Force: +2.5 to -0.5 g
Ceiling (m):
- Service: 5,703
- Hover (out of ground effect): 915
- Hover (in ground effect): 4,270

Vertical Climb Rate (m/s): 4.0
Internal Fuel (liters): 1,150
Range (km):
- Normal Load: 590
- With Aux Fuel: N/A

Dimensions (m):
- Length (rotors turning): 17.7
- Length (fuselage): 14.7
- Width (including wing): 3.3
- Height: 4.2
- Main Rotor Diameter: 14.7
- Tail Rotor Diameter: 3.0

Standard Payload (kg): 1,740

Survivability/Countermeasures:
Infrared signature suppressors mounted on engine exhaust.
Radar and laser warning receivers, IFF, Infrared jammer, missile warning system, chaff and flares, and rotor brake.
Armored cockpit.

ARMAMENT

20-mm 3x barrel Gatling gun, M197:
Range: (practical) 1,500 m
Elevation: 21° up to 50° down
Traverse: 220°
Ammo Type: AP, HE
Rate of Fire: Burst 16±4, continuous 730±50

Most Probable Armament:
AH-1W: M197, 3x barrel 20-mm Gatling gun in chin turret. Also on underwing hardpoints, 8x TOW or Hellfire antitank missiles (or four of each), and 2x 2.75-in FFAR rocket pods. AIM-9 Sidewinder or AIM-123 Sidearm missiles provide air-to-air capability.

AVIONICS/SENSOR/OPTICS

The missile targeting system uses a telescopic sight unit (traverse 110º, elevation –60º/+30º) with two magnifications/fields of view, a laser augmented tracking capability, TV, video recorder, thermal sights, FLIR, Doppler navigation, and a digital ballistic computer for acquisition, launch, and tracking of all TOW or Hellfire missiles in all weather conditions. The helmet-mounted display integrates NVGs with missile targeting and gun turret. The system allows the aircraft to self-designate targets.

Night/Weather Capabilities:
The AH-1 is fully capable of performing its attack and armed escort missions in all weather conditions from land- or sea-based launching platforms.

VARIANTS

Most older AH-1J and AH-1T Seacobra variants still in operation have been upgraded to the AH-1W standard.

AH-1J: Initial twin engine AH-1 variant fielded in the early 1970s.

AH-1T: Upgraded engines and powertrain system for improved performance. This minimally expanded rotor system and overall dimensions of the AH-1J.

AH-1RO: Construction of a variant of the aircraft may occur in the near future in Romania. Talks are ongoing between IAR industries and Bell Textron. It may be produced under the name "Dracula".

AH-1Z/-1(4B)W: Four-bladed variant called the "King Cobra" or "Viper" that contains an integrated digital cockpit, and has better flight performance.

AH-1P/-1E/-1F: See separate AH-1F entry.

NOTES
Available munitions shown above; not all may be employed at one time. Mission dictates weapon configuration. External stores are mounted on underwing external stores points. Each wing has two hardpoints for a total of four stations. A representative mix when targeting armor formations is eight TOW or Hellfire missiles (sometimes four of each missile is loaded), two 2.75-in rocket pods, and 750x 20-mm rounds. The gun must be centered before firing underwing stores. Additional missions include direct air support, antitank, armed escort, and air to air. Armored cockpit can withstand small arms fire, composite blades, tailboom, and fuel tanks withstand 23-mm cannon hits. This aircraft costs approximately $10.7 million which is considered inexpensive when compared to other modern attack helicopters, but it's performance is similar. Therefore many nations consider this aircraft as a possible candidate for fielding in attack helicopter squadrons.

Chapter 10
Fixed-Wing Aircraft

This chapter provides the basic characteristics of selected fixed-wing aircraft readily available to the OPFOR. Both FM 100-60, *Armor- and Mechanized-Based Opposing Force: Organization Guide*, and FM 100-63, *Infantry-Based Opposing Force: Organization Guide*, use descriptors to indicate aircraft capabilities.

Fixed-Wing Aircraft covers the systems that will affect the planning and actions of the tactical-level ground maneuver force, and aircraft commonly employed by the OPFOR when in close proximity to enemy ground forces. Therefore, fighters, interceptors, and long-range bombers are not addressed. This chapter classifies aircraft as strike, ground-attack, and transport. Some multi-role aircraft are able to support missions across each of the categories. Therefore, they are listed in each of the above categories by their initial design, and their planned application. This chapter encompasses many aircraft which may have a dual civil/military application. It does not include, however, aircraft designed and used primarily for civil aviation.

This initial sampling of systems was selected because of their wide proliferation across numerous countries or because of their already extensive use in training scenarios. Additional data sheets addressing other widely proliferated aircraft will be sent with further supplements to this guide.

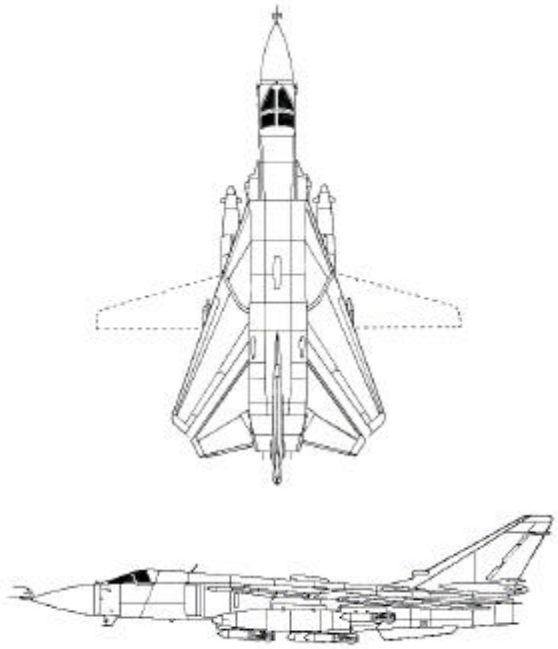
Because of the increasingly large numbers of variants of each aircraft, only the most common variants produced in significant numbers are addressed. If older versions of airplanes have been upgraded in significant quantities to the standards of newer variants, the older versions were not addressed.

The munitions available to each aircraft are mentioned, but not all may be employed at the same time. The weapon systems inherent to the airframe are listed under armament. The most probable weapon loading options are also given, but assigned mission dictates actual weapon configuration. Therefore, any combination of the available munitions may be encountered.

Questions and comments on data listed in this chapter should be addressed to:

CPT Michael Kubala
DSN: 552-7922, Commercial (913) 684-7922
e-mail address: kubalam@leav-emh1.army.mil

Russian Strike Aircraft Su-24D/FENCER



Weapon & Ammunition Types	Combat Load
23-mm 6x barrel Gsh-6-23 gun	**250**
Other Loading Options	
TN1000 or TN11200 nuclear weapons	
100-kg FAB-100 bombs	**38**
TV or laser-guided bombs	**4**
AS-7/KERRY ASM or AS-10/KAREN ASM or AS-11/KILTER ASM or AS-12/KEGLER ASM or AS-13/KINGBOLT ASM or AS-14/KEDGE ASM or AS-17/KRYPTON ASM	
Gun pods	**3**
AA-8/APHID AAM	**2**
External fuel tanks (liters)	**2,000 or 3,000**

SYSTEM

Alternative Designations: None
Date of Introduction: 1975
Proliferation: At least 11 countries

Description:
Crew: 2 (pilot, weapon systems operator)
Appearance:
- Wings: High-mount, variable, tapered back
- Engines: Both along body, under wings

Engines: 2x 17,200-shp Lyluka AL-21F-3A turbojet (24,700-shp with afterburner)
Weight (kg):
- Maximum Gross: 39,700
- Normal Takeoff: 35,910
- Empty: 22,320

Speed (km/h):
- Maximum (at altitude): 2,320
- Maximum (sea level): 1,530
- Maximum Attack Speed: 1,200
- Cruise: INA
- Takeoff/Landing Speed: INA

Max "G" Force (g): +6.5 g
Ceiling (m):
- Service (clean): 17,500
- With External Stores: INA
- Vertical Climb Rate (m/s): 150

Fuel (liters):
- Internal: 11,760
- External: 8,000

Range (km):
- Maximum Load: 940
- With Aux Fuel: 1,230
- Combat Radius: 950

Takeoff Run/Landing Roll (m):
- Prepared Surface: 1,100-1,200/950

Dimensions (m):
- Length: 24.6
- Wingspan: 17.6 extended, 10.4 swept
- Height (gear extended): 6.2

Standard Payload (kg):
- External: 8,000
- Hardpoints: 9 underwing

Survivability/Countermeasures:
Pressurized cockpit with zero/zero ejection seats, infrared and radar jammer, radar and missile warning receivers, chaff and flares.

ARMAMENT
23-mm 6x barrel gun, Gsh-6-23:
Range (m): (practical) 2,500
Elevation/Traverse: None (rigidly mounted)
Ammo Type: HEFI
Rate of Fire (rpm): 9,000

AVIONICS/SENSOR/OPTICS
The Su-24 has integrated navigation and fire control radars, pulse-doppler terrain following radar coupled to autopilot, laser/TV targeting and weapon guidance system, and laser rangefinder/ designator.

Night/Weather Capabilities:
The Su-24 is capable of attacking ground and surface targets in day, night, and poor weather conditions.

VARIANTS

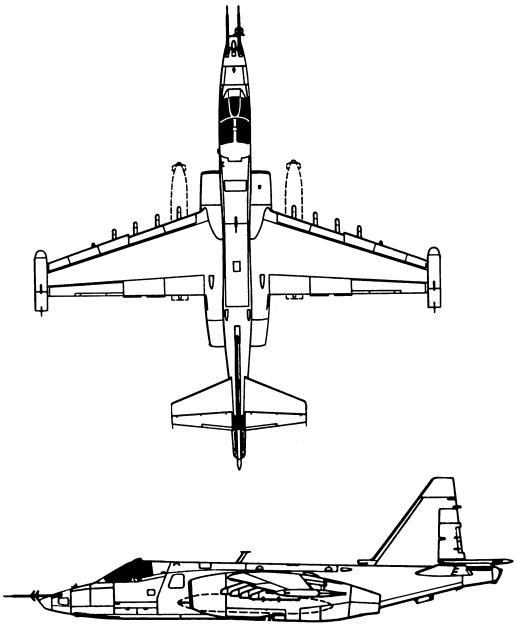
Su-24M/-24MK/FENCER D: Attack version, and export model.

Su-24MR/FENCER E: Maritime reconnaissance version with a side-looking radar, TV camera, infrared scanner, and conventional cameras, ECM suite, or ELINT pods. It has datalink to ground, and no gun.

Su-24MP/FENCER F: Another recon and electronic warfare variant.

NOTES
This aircraft was the first developed specifically as a bomber for the ground-attack role. It has a variable swept-wing, that can be set at 16, 45, or 69 degrees. Some aircraft are capable of aerial refueling, and all can carry up to three external fuel tanks for extended range. There is no internal weapons bay. Available munitions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing hardpoints. Each wing has four points, and the center fuselage attachment point gives nine total stations.

Georgian/Russian Ground-Attack Aircraft Su-25/FROGFOOT



Weapon & Ammunition Types	Combat Load
30-mm twin barrel Gsh-30-2 gun	**250**
Other Loading Options	
AT-16 VIKhR ATGM (8 each)	**16**
23- or 30-mm GSH gun pods	**260 ea**
57-mm S-5 rocket pod (32 ea) or 80-mm S-8 rocket pod (20 ea)	**8** **8**
AS-7/KERRY ASM or AS-10/KAREN ASM or AS-14/KEDGE ASM or AS-11/KILTER ASM or AS-17/KRYPTON ASM	**8**
AA-8/APHID or AA-10/ALAMO	**2**
50-kg to 500-kg bombs	**4,000 kg**
External fuel tanks (liters)	**800/1,150**

SYSTEM

Alternative Designations: Gratch, Rook
Date of Introduction: 1980
Proliferation: At least 15 countries

Description:
Crew: 1 (pilot)
Appearance:
- Wings: High-mount, tapered back
- Engines: Both along body, under wings

Engines: 2x 4,000-shp Ryzhov (Soyuz/Tumansky) R195 Turbojet
Weight (kg):
- Maximum Gross: 17,600
- Normal Takeoff: 14,500
- Empty: 9,525

Speed (km/h):
- Maximum (at altitude): 880
- Maximum (sea level): 950
- Maximum Attack Speed: 690
- Cruise: 700
- Takeoff/Landing Speed: 220

Max "G" Force (g): +6.5 g
Ceiling (m):
- Service (clean): 7,000
- With External Stores: 5,000

Vertical Climb Rate (m/s): 72
Fuel (liters):
- Internal: 3,660
- External: 3,762

Range (km):
- Maximum Load: 500
- With Aux Fuel (2 tanks): 640
- Combat Radius: 556

Takeoff Run/LandingRoll (m):
- Prepared Surface: 550/600
- Unprepared Surface: 650/750
- Max Load: 1,200

Dimensions (m):
- Length: 15.5
- Wingspan: 14.5
- Height (gear extended): 4.8

Standard Payload (kg):
- External: 4,400 or 6,400 (Su-25T)
- Hardpoints: 10 underwing, w/500 kg ea

Survivability/Countermeasures:
Armored cockpit and engines, zero/100 km/hr ejection seat, self-sealing fuel tanks, and strengthened flight control linkages.
IFF, infrared jammer, radar warning receiver, chaff and flares.

ARMAMENT
30-mm 2x barrel gun, Gsh-30-2:
Range (m): (practical) 4,000
Elevation/Traverse: None (rigid mount)
Ammo Type: AP, HE, CC
Rate of Fire: Burst 50

AVIONICS/SENSOR/OPTICS
The targeting system incorporates a LLLTV, integrated navigation and aiming system, active bomb sight, and laser rangefinder/ designator. The aircraft uses an INS, GPS, and Doppler navigation.

Night/Weather Capabilities:
The Su-25 is fully capable of performing its direct air support mission in day, night, and poor weather conditions.

VARIANTS
Early Su-25s had 2x Soyuz/ Gavrilov R95SH engines. Most now upgraded.

Su-25A/-25K: Initial variant, and export.

Su-25B/-25UB/-25UBK/-UBP: A two-seat combat aircraft, naval version, and trainer.

Su-25T/-25TM/-25TK: Developed from the Su-25UB. Height changed to 5.2 m to hold avionics and extra fuel. All with R195 engine for increased range, ceiling, and load. Other characteristics generally similar. Upgraded targeting, acquisition, and countermeasures.

Su-39: Export variant of Su-25T.

NOTES
Available munitions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing hardpoints. Each wing has five points for a total of ten stations. A representative mix when targeting armor formations would be 16x AT-16 ATGMs, two rocket pods, two 23-mm gun pods, 250x 30-mm rounds, and two AA-8s. The titanium cockpit is invulnerable to 20-mm cannon fire, and 30-mm fire from oblique angles. The aircraft can carry a self-contained maintenance kit in 4 underwing pods. Also the engines can operate on any type of fuel likely to be found in the forward-operating areas, including diesel and gasoline. This allows the crew to operate from unprepared airfields for extended periods of time.

Chapter 11
Command and Communications Systems

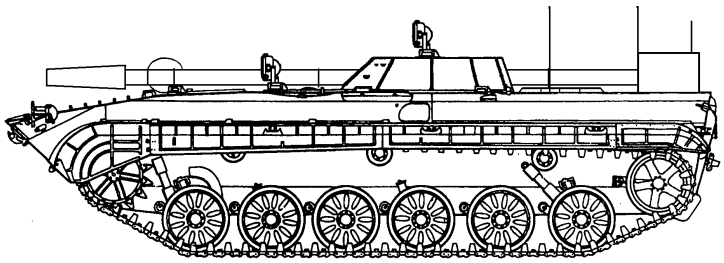
Command systems in the WEG will initially be limited to command vehicles, such as the listed BMP-1KSh.

This chapter provides basic characteristics of selected tactical communications systems either in use or readily available to the OPFOR. This selection of radios is not intended to be complete; rather, it is representative of the types and capabilities that are currently fielded or available. Radio tables are divided into two sections, single channel and frequency hopping systems. Later updates of this chapter will include information on additional categories of communications systems.

Radio data was provided by Mr. Eric L. Berry**,** e-mail: berrye@leav-emh1.army. mil. Questions and comments on data listed in this chapter should be addressed to:

Mr. Thomas W. Redman
DSN: 552-7925 Commercial (913) 684-7925
e-mail address: redmant@leav-emh1.army.mil

Russian Command and Staff Vehicle BMP-1KSh



Weapons & Ammunition Types	Typical Combat Load
Stowed 7.62-mm MG	**2,000**

SYSTEM
Alternative Designations: BMP M1978
Date of Introduction: 1976
Proliferation: At least 3 countries
Description:
Crew: 3
Troop Capacity: N/A
Combat Weight (mt): 13.0
Chassis Length Overall (m): 6.74
Height Overall (m): 2.07
Width Overall (m): 2.94
Ground Pressure (kg/cm^2): 0.57

Automotive Performance:
Engine Type: 300-hp Diesel
Cruising Range (km): 550
Speed (km/h):
- Max Road: 65
- Max Off-Road: 40-45
- Average Cross-Country: INA
- Max Swim: 7

Fording Depth (m): Amphibious

Radio: R-130 HF, R-107, R-111 VHF, R-123/173 VHF

Protection:
Armor, Turret Front (mm): 19-23
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): Available
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 7.62-mm (7.62x 54R) MG, PKM , stowed
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts
Loader Type: Belt-feed (100-rd belts)
Ready/Stowed Rounds: INA
Elevation (°): INA
Fire on Move: No

ATGM Launcher: N/A

Firing Ports: None

SIGHTS
Type: INA
Sighting range (m): 1,500
Magnification: INA
Night Sights Available: Yes

VARIANTS
BMP-1KShM: Variant has upgraded radios.

MP-31/1V31 and **9S743** use different radio configurations.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
7.62-mm API, API-T
- Maximum Aimed Range (m): 1,500
- Max Effective Range (m):
  - Day: 1,000/400-500 on the move
  - Night: INA
  - Tactical AA Range: INA
- Armor Penetration (mm): 8 (RHA) at 500 m

Other Ammunition Types: Light Ball/Ball-T, Heavy Ball

NOTES
For stationary long-range transmissions, HAWK EYE 10-meter folding antenna is removed from carrying case on right side of vehicle and inserted into antenna base, which extends forward from the turret. The trunnions and motor from the base vehicle (BMP-1) gun are used to operate the antenna base. The antenna can then be elevated mechanically to a vertical position.

Other Electronics: R-102 automatic calling device, 1T-219M secure speech device, TNA-1inertial navigation, 1G11N gyrocompass. On the hull rear is a generator to operate the radios.

Options are spall liners, air conditioning, and a more powerful engine. A French SNPE explosive reactive armor (ERA) kit and others are available for use. Additional armor application may jeopardize amphibious capability.

Tactical Single Channel Radios

Radio	Country of Origin	Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Range (km)	Power Output
PRC-105/A	Iran	Man-portable VHF radio	36-76	25	1,600		0.6/2.5/5 W
PRC-110	Iran	Man-portable HF radio with 10 pre-set channels	1.6-29.999	100	284,000		5/20 W
PRC-1077	USA	Man-portable VHF radio. PRC 1077/GRC-160 (low power) and PRC 1077/VRC-46 (high power) vehicular models.	30-88	25	2,320		Man-portable: 100m/2/5 W Vehicular: 100m/2/5/50 W
PRC/ VRC-4600	Turkey	Modular family of VHF/FM radios Embedded encryption	30-76	25 or 50	920 or 1,840	40 w/30W variant	2.5 W manpack PRC-4620 2.5/10/30 W vehicular VRC-4622 2.5 W tank set VRC-4621 (w/companion 12.5/10/30 W VRC-4623)
R-107	FSU	Provides tactical, manportable FM HF/VHF voice communications	20-52	25	1,281	6 w/1.5-m whip, 15 w/2.7-m rod or 40-m wire, 25 w/raised long wire	1 W
R-123M	FSU	Vehicle-mounted tactical FM HF/VHF communications	20-51.5	25	1,261	20 w/4-m whip (moving) 50 w/10-m telescoping mast	20 W
R-130	FSU	Vehicle-mounted AM HF voice and CW communications	1.5-10.99 transmit 1.0-10.99 receive	10	950	50 w/4-m whip, 75 w/10-m whip or sloping wire, 350 w/symmetrical dipole	10-40 W
R-148	FSU	Lightweight FM VHF manportable transceiver.	37.0-51.95	50	300	5 w/1.5-m whip	1.1-2.1 W
R-171M	FSU	Vehicle-mounted FM VHF commu-nications. Capable of 16 kbits/s data transmission.	30.0-75.999	INA		35-80 claimed	100 W
R-173	FSU	Tactical FM VHF communications	30-76	1		20 w/3-m whip	30 W

Tactical Single Channel Radios (continued)

Radio	Country of Origin	Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Range (km)	Power Output
RU-3	FRY	Man-portable VHF radio. Digital data up to 2.4 kbit/s, digital voice up to 16 kbit/s. 40 preset channels.	30-79.975	25	2,000	7	0.3/3 W
SFH-41	Sweden	Chameleon tactical hand-held single-channel and FH radio. Receives single-or FH signals and automatically selects FH reply. 12.5,25, or 50 hps.	148-174	25 or 30	INA	INA	2/5 W
TRC350	France	Man-portable HF/SSB radio. Encryption capability. Vehicular-model TRC331, 20 W.	1.5-30	100	285,000	INA	2 W reduced power 10 W average in data mode 15 W morse, 20 W SSB voice
Type 889	China	Tactical FM VHF voice comms. Capable of 16 kbits/s data transmission in wideband mode and connected to a digital terminal set.	20.0-49.975	25 or 50	1,200 or 600	30 w/2.85-m (probable) whip, narrow band, and high-power mode	3 or 20 W
VRC-90	China	Vehicular VHF/FM radio. 16 kbit/s data capability.	30-87.975	25	2,320		0.2/3.5/50 W
XV3088	Germany	Man-portable VHF pouch radio. 9 pre-set channels. Maybe vehicular-mounted. 2.4 kbit/s data transmission.	30-87.975	25	2,320	500 meter remote.	0.2/5 W 25/50 W with power amp.

Tactical Frequency Hopping Radios

Radio	Country of Origin	Spread Spectrum Radio Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Power Output
ACV46	South Africa	Vehicular VHF FH. 99 preset channels, embedded encryption. Remote operation by wire up to 2 km	30-87.975	25	INA	INA
ACM48	South Africa	Man-portable VHF radio. Embedded encryption, data.	30-87.975	12.5 or 25	INA	0.4/4 W
ART 2000	Iran	Man-portable or vehicular VHF FH radio with 100+ hps. May be remoted up to 3 km.	30-88	25	2,320	0.1/3 W
JAGUAR-U	United Kingdom	Tactical UHF FH radio, with man-portable, airborne, and mobile/ground station capabilities. Embedded encryption in FH mode.	225-400	25	7,000	Man-portable: 10mW/4W. Airborne: 10mW/4W/15W. Mobile: 10mW/4W/50W.
JAGUAR-V	United Kingdom	Man-portable or vehicle-mounted VHF frequency hopping combat net radio, 100 hps. Compatible w/ conventional 25/50 KHz channel-spaced radios. Operates in nine 6.4 MHz sub-bands or full-band 58 MHz. May be remote -operated by wire to 4 km. Embedded encryption	30-88	25	2,320	Man-portable: 10 mW and 5 W. Vehicle-mounted: 20 and 50 watts
Leprechaun	USA	Hand-held FH VHF radio. Embedded encryption.	30-88	INA	INA	5 W
LVP 235	India	VHF radio available in FH or fixed-frequency models. Projected 100-150 hps over full band. Embedded encryption.	30-88	INA	INA	5 W
PANTHER 2000-V	United Kingdom	VHF FH radio with man-portable, vehicular, and airborne versions. 8 pre-programmable channels. May be remoted up to 4 km. Narrow band: 9 hop bands of 6.4 MHz with 256 channels. Wideband: 58 MHz band with 2320 channels. 100 hps. Embedded encryption.	30-108	25	3,120	Man-portable 20W Vehicular 20W/50W Airborne 20W
PRC-73B	Yugo-slavia	Man-portable VHF FH radio with 100-200 hps over 5 MHz band.	30-90	INA	2,400	5 W
PRC-117A	USA	Man-portable VHF FM FH radio. Uses KY-57 VINSON encryption	30-89.975	25	2,400	0.1/1/10 W
PRC-119	USA	Man-portable VHF FM FH radio. 8 programmable single-channel and 6 frequency-hopping pre-set channels. Integrated voice and data secure communications.	30-88	INA	2,320	4.5 W

Tactical Frequency Hopping Radios (continued)

Radio	Country of Origin	Spread Spectrum Radio Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Power Output
PRC-130	USA	Man-portable HF FH radio with 10 hps. Embedded encryption.	2.0-30	INA	280,000	5/20/100 W
PRC-710	Israel	Hand-held FH VHF radio, embedded encryption.	30-88	25	2,320	5 W adjustable
PRC 1080	USA	Hand-held FH VHF radio. Embedded encryption, 9 preset channels.	30-87.975	25	2,320	Selectable 100 mW-2W
PRC/VRC-9600	Turkey	Man-portable or vehicular-mounted VHF FH with 100-200 hps. Capable of burst-data transmission. Embedded encryption.	30-88	25	3,120	5 W man-portable 5/50 W vehicular
RAVEN 2V	United Kingdom	Man-portable, hand-held, vehicular, or base station VHF FH radio. Capable of burst-data transmission, data-rate adapter. Voice/data encryption, remote operation. Expected hop rate approx 150 hps.	30-88	25	2,320	Vehicular 50 W
RU-5	Yugo-slavia	Man-portable VHF/FM FH radio. Embedded en-cryption. Up to 16 kbit/s data transmission. Full-band hop set at approx. 100 hps. 10 pre-set chan-nels.	30-87.975	25	2,320	0.5/5 W
SCIMITAR-H	United Kingdom	Vehicular-mounted HF FH radio. Burst-data trans-mission capability. Wire-remote up to 3 km. Em-bedded encryption.	1.6-30	100	284,000	20 W man-portable, 100/400 W ve-hicular-mounted.
SCIMITAR-V	United Kingdom	Man-portable or vehicular VHF FH radio with 150-250 hps over 58 MHz band. Embedded encryption.	30-88	25	2,320	0.1/5/50 W
SEM 173-193 CNR System	Germany	Modular series of VHF CNR radios, with the SEM 173 transceiver as the common unit. Remote opera-tion up to 4 km. Embedded encryption. SEM 173 man-portable: SEM 173 V vehicular SEM 183 vehicular; SEM 193 vehicular SEM 183/193 dual station; SEM 193/193 dual station	30-108	12.5 or 25	3,120 or 6,240	SEM 173, 183 0.05/0.5, 5 W. SEM 193, 183/193 0.05/0.5/5/50 W.
StarCom	Sweden	Man-portable and vehicular FH VHF radio. Embed-ded encryption, remote operation by wire up to 6 km.	30-87.975	25	2,320	Man-portable 5 W Vehicular 5/50 W

GLOSSARY

AA - antiaircraft
acquisition range - sensor range against a category of targets. Targets are usually categorized as infantry, armored vehicles, or aircraft. Acquisition includes four types (or levels of clarity, in ascending order of clarity): detection, classification, recognition, and identification. Where the type of acquisition is not specified, the acquisition range will be regarded as sufficient for accurate targeting. This range is comparable to the former Soviet term *sighting range*.
AAM - air-to-air missile
AGL - automatic grenade launcher
AIFV- airborne infantry fighting vehicle
aka - also known as
AM - amplitude modulated (communications)
antitank - functional area and class of weapons characterized by destruction of tanks. In the modern context used in this guide, the role has expanded to fit the term "antiarmor" (which includes systems and munitions which can be employed against light armored vehicles)
AP - antipersonnel
APAM - antipersonnel - anti-materiel (ammunition)
APE - armor-piercing explosive (ammunition)
APERS-T - antipersonnel - tracer (ammunition)
APC - armored personnel carrier
APC-T - armor-piercing capped tracer (ammunition)
AP HE - armor-piercing high explosive (ammunition)
API-T - armor-piercing incendiary tracer (ammunition)
APERS-T - antipersonnel tracer (ammunition)
APT - armor-piercing tracer (ammunition)
APU - auxiliary power unit; auxiliary propulsion unit
ASM - air-to-surface missile
AT - antitank
ATGL - antitank grenade launcher
ATGM - antitank guided missile
aux - auxiliary
average cross-country (speed) - vehicle speed (km/hr) on unimproved terrain without a road
AVLB - armored vehicle-launched bridge

burst (rate of fire) - artillery term: the greatest number of rounds that can be fired in 1 minute

caliber - munition diameter (mm or inches), used to classify munition sizes; barrel length of a cannon (howitzer or gun), measured from the face of the breech recess to the muzzle
canister - close-range direct-fire ammunition which dispenses a fan of flechettes forward
CC - cargo-carrying (ammunition)
CCM - counter-countermeasure

CE - chemical energy: the class of ammunition which employs a shaped charge for the lethal mechanism. Ammunition types which employ CE include HEAT and HESH (see below).
CM - countermeasure
coax - coaxial
CRV - combat reconnaissance vehicle
CW - continuous wave (communications)
cyclic (rate of fire) - maximum rate of fire for an automatic weapon (in rd/min)

decon - decontamination
direct-fire range - maximum range of a weapon, operated in the direct-fire mode, at which the bullet's trajectory will not rise above the height of the intended point of impact on the target. At this range, the gunner is not required to adjust for range in order to aim the weapon. The comparable Russian term is *point blank range*.
DPICM - dual-purpose improved conventional munitions (ammunition)
DPICM-BB - dual-purpose improved conventional munitions, base-bleed (ammunition)
DU - depleted uranium (ammunition)
DVO - direct-view optics

ECM - electronic countermeasure
EMD - engineering, manufacture and development. Fielding phase between prototype and IOC.
EO - electro-optic, electro-optical
ERA - explosive reactive armor
ERFB - extended range full-bore (ammunition)
ERFB-BB - extended range full-bore, base-bleed (ammunition)
est - estimate
ET - electronic timing (ammunition fuze type)
European - from a consortium of firms located or headquartered in several European countries

FAE - fuel-air explosive (ammunition). This munition technology is employed in aerial bombs and artillery munitions, and uses a dispersing explosive fill to produce intense heat, a long-duration high-pressure wave, and increased HE blast area
FCS - fire control system
FFAR - folding-fin aerial rockets
flechette – small steel darts (much like nails) used to fill artillery rounds (and some bombs). Generally thousands of these darts are fired (similar to a shotgun in an anti-personnel role) dispensing the flechettes forward over a wide area. Unlike **canister rounds,** FSU artillery rounds use a time fuze, permitting close-in direct fire, long-range direct fire, and indirect fire.
FH - frequency-hopper (radio, communications)
FLIR - forward-looking infrared (thermal sensor)
FLOT - forward line of own troops
FM - frequency modulated (communications)
FOV - field of view
frag-HE - fragmentation-high explosive (ammunition)
FSU - former Soviet Union

gen - generation. Equipment such as APS and (thermal and II) night sights are often categorized in terms of 1st, 2nd or 3rd generation of development, with different capabilities for each.
GP MG - general purpose machinegun
GPS - global positioning system

HE - high explosive (ammunition)
HEAT - high-explosive antitank (also referred to as shaped-charge ammunition)
HEAT-FS - high-explosive antitank, fin-stabilized (ammunition)
HEAT-MP - high-explosive antitank, multi-purpose
HEFI - high-explosive fragmentation incendiary (ammunition)
HEI - high-explosive incendiary (ammunition)
HEP-T - high explosive plastic-tracer (ammunition)
HESH - high-explosive squash head (ammunition)
HF- high frequency (communications)
hps - hops per second (communications)
HUD - head-up display
HVAP-T - hypervelocity, armor-piercing tracer (ammunition)

I-T - incendiary - tracer (ammunition)
IFF - identification friend-or-foe
IFV - infantry fighting vehicle
II - image intensification (night sighting system)
ILS - instrument landing system
INA - information not available
IR - infrared

K-kill - catastrophic kill (simulation lethality data)
kbits - kilobites per second (communications)
KE - kinetic energy: class of ammunition which transfers energy to the target for the lethal mechanism. Ammunition types which employ KE include AP, APFSDS-T, and HVAP-T.

LAFV - light armored fighting vehicle
LLLTV - low-light-level television
LMG - light machinegun
LRF - laser rangefinder

mach - speed of sound, based on atmospheric conditions (1160 km/h at sea level)
max - maximum
maximum aimed range - maximum range of a weapon (based on firing system, mount, and sights) for a given round of ammunition, while aiming at a ground target or target set with sights in the direct-fire mode. The range is not based on single-shot hit probability on a point target, rather on tactical guidance for firing multiple rounds if necessary to achieve a desired lethality effect. One writer referred to this as *range with the direct laying sight*. Even greater ranges were cited for *salvo fire*, wherein multiple weapons (e.g., tank platoon) will fire a salvo against a point target.

max effective range - maximum range at which a weapon may be expected to achieve a high single-shot probability of hit (50%) and a required level of destruction against assigned targets. This figure may vary for each specific munition and by type of target (such as infantry, armored vehicles, or aircraft).
max off-road (speed) - vehicle speed (km/hr) on dirt roads
MCLOS - manual command-to-line-of-sight
MG - machinegun
Mk - Mark
MRL - multiple rocket launcher

N/A - not applicable
NBC - nuclear, biological, and chemical
Nd - neodymium, type of laser rangefinder
NFI - no further information
normal (rate of fire) - artillery term: rate (in rd/min) for fires over a 5-minute period
NVG - night-vision goggle
NVS - night-vision system

PD - point-detonating (ammunition fuze type)
Ph - probability of hit (simulation lethality data)
PIBD - point-initiating base-detonating (ammunition fuze type)
pintel - post attached to a firing point or vehicle, used to replace the base for a weapon mount
Pk - probability of kill (simulation lethality data)
practical (rate of fire) - maximum rate of fire for sustained aimed weapon fire against point targets. The rate includes reload time and reduced rate to avoid damage from overuse. Former Soviet writings also refer to this as the **technical rate of fire**.

RAP - rocket-assisted projectile (ammunition type)
recon - reconnaissance
Rd - round
ready rounds - rounds available for use on a weapon, whether in autoloader or in nearby stowage, which can be loaded within the weapon's stated rate of fire
RF - radio frequency
RHA - rolled homogeneous armor, often used as a standard armor hardness for measuring penetration of anti-tank munitions
RHAe - RHA equivalent, a standard used for measuring penetrations against various type armors
rpm - rounds per minute (aircraft)

SACLOS - semiautomatic command-to-line-of-sight
SAM - surface-to-air missile
shp - shaft horsepower (aircraft)
SP - self-propelled
SSM - surface-to-surface missile

stadiametric - in this guide, a method of range-finding using stadia line intervals in sights and target size within those lines to estimate target range
stowed rounds - rounds available for use on a weapon, but stowed and requiring a delay greater than that for ready rounds (and cannot be loaded within the weapon's stated rate of fire)
sustained (rate of fire) - artillery term: rate (in rd/min) for fires over the duration of an hour

tactical AA range - maximum targeting range against aerial targets, aka: **slant range**
TAR - target acquisition radar
TELAR - transporter-erector-launcher and radar
thermobaric - HEI volumetric (blast effect) explosive technology similar to fuel-air explosive and used in shoulder-fired infantry weapons and ATGMs
TLAR - transporter-launcher and radar
TOF - time of flight (seconds)
TTP - tactics, techniques, and procedures
TTR - target tracking radar

UI - unidentified

VEESS - vehicle engine exhaust smoke system
VHF - very high frequency (communications)
vs - versus

w/ - with (followed by associated item)
WP - white phosphorus (ammunition)